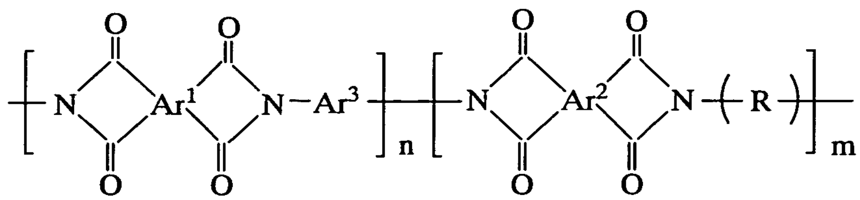
## CLAIMS

1. A polyimide resin having a basic skeleton represented by the following general formula:

[Formula 1]

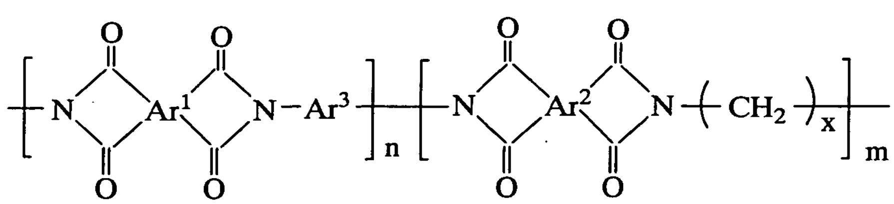


(1)

(in the formula (1), each of $Ar^1$ and $Ar^2$ is an aromatic ring having a carbon number of 6-20, which forms an imide ring of 5 or 6 atoms with an imide group adjoining thereto. In the aromatic ring, a part of carbon atoms may be substituted with S, N, O, $SO_2$ or CO, or a part of hydrogen atoms may be substituted with an aliphatic group, a halogen atom or a perfluoro aliphatic group. $Ar^1$ and $Ar^2$ may be same or different. R is at least one of linear alkylene group and branched alkylene group having a carbon number of 1-20. $Ar^3$ is an aromatic ring having a carbon number of 6-20 in which at least a part of hydrogen atoms is substituted with at least one of sulfoalkoxy group, carboalkoxy group and phosphoalkoxy group having a carbon number of 1-20 and a part of carbon atoms in these groups may be substituted with S, N, O, $SO_2$ or CO, or a part of hydrogen atoms may be substituted with an aliphatic group, a halogen atom or a perfluoro aliphatic group. n and m show a polymerization degree and are an integer of not less than 2.)

2. A polyimide resin according to claim 1, wherein the basic skeleton is represented by the following general formula (2):

[Formula 2]



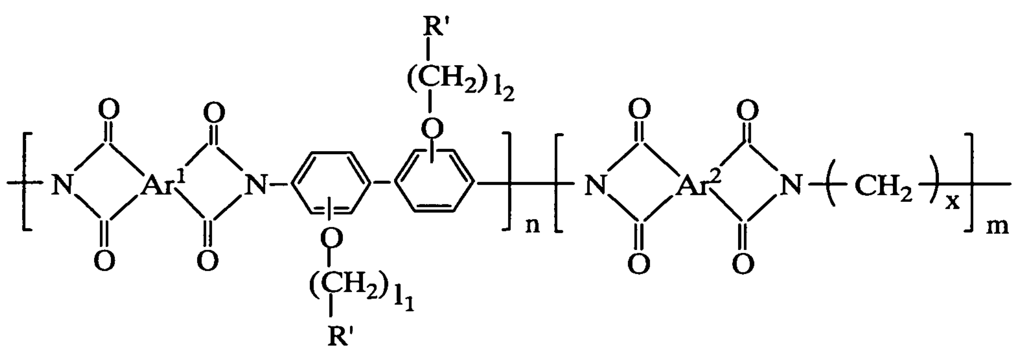
(2)

(in the formula (2), each of $Ar^1$ and $Ar^2$ is an aromatic ring having a carbon number of 6-20, which forms an imide ring of 5 or 6 atoms

with an imide group adjoining thereto. In the aromatic ring, a part of carbon atoms may be substituted with S, N, O, $SO_2$ or CO, or a part of hydrogen atoms may be substituted with an aliphatic group, a halogen atom or a perfluoro aliphatic group. $Ar^1$ and $Ar^2$ may be same or different. x shows the carbon number of an alkylene group and is an integer of 1-20. $Ar^3$ is an aromatic ring having a carbon number of 6-20 in which at least a part of hydrogen atoms is substituted with at least one of sulfoalkoxy group, carboalkoxy group and phosphoalkoxy group having a carbon number of 1-20 and a part of carbon atoms in these groups may be substituted with S, N, O, $SO_2$ or CO, or a part of hydrogen atoms may be substituted with an aliphatic group, a halogen atom or a perfluoro aliphatic group. n and m show a polymerization degree and are an integer of not less than 2.)

3. A polyimide resin according to claim 2, wherein the basic skeleton is represented by the following general formula (3):

[Formula 3]



(3)

(in the formula (3), each of $Ar^1$ and $Ar^2$ is an aromatic ring having a carbon number of 6-20, which forms an imide ring of 5 or 6 atoms with an imide group adjoining thereto. In the aromatic ring, a part of carbon atoms may be substituted with S, N, O, $SO_2$ or CO, or a part of hydrogen atoms may be substituted with an aliphatic group, a halogen atom or a perfluoro aliphatic group. $Ar^1$ and $Ar^2$ may be same or different. Also, R' is at least one of a sulfonic acid group, a carboxylic acid group and phosphinic acid group, and each of $l_1$ and $l_2$ is a carbon number of at least one of a sulfoalkoxy group, a carboalkoxy group and a phosphoalkoxy group and is an integer of 1-20. $l_1$ and $l_2$

may be the same or different. In the formula (2), x shows a carbon number of an alkylene group and is an integer of 1-20.)

4. A polyimide resin according to claim 3, wherein the carbon number of at least one of a sulfoalkoxy group, a carboalkoxy group and a phosphoalkoxy group shown by $l_1$ and $l_2$ in the general formula (3) is 3 or 4.

5. A polyimide resin according to any one of claims 1 to 4, wherein n/m in the general formulae (1)-(3) is not more than 95/5 but not less than 30/70.

6. A polyimide resin according to any one of claims 1 to 5, wherein a part of at least one of the linear alkylene group and the branched alkylene group shown by R in the general formulae (1)-(3) includes a crosslinking structure.

7. A polyimide resin according to any one of claims 1 to 6, wherein an average molecular weight is not less than 5000.

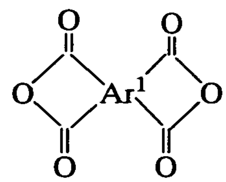
8. A method of producing a polyimide resin, characterized by comprising a dissolution step under heating a mixture of α, ω-alkylene diamine, a diamino compound represented by a general formula (4):

$H_2N\text{-}Ar^3\text{-}NH_2 \quad \cdots\cdots \ (4)$

(in the formula (4), $Ar^3$ is an aromatic ring having a carbon number of 6-20 in which at least a part of hydrogen atoms is substituted with at least one of a sulfoalkoxy group, a carboalkoxy group and a phosphoalkoxy group having a carbon number of 1-20 and a part of carbon atoms in these groups may be substituted with S, N, O, $SO_2$ or CO, or a part of hydrogen atoms may be substituted with an aliphatic group, a halogen atom or a perfluoro aliphatic group), a tertiary amine and an organic solvent; and

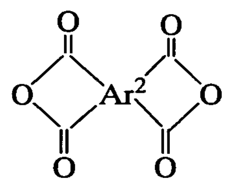
a polymerization step of adding the above mixture with an aromatic tetracarboxylic acid di-anhydride compound represented by a general formula (5) or (6):

[Formula 4]



(5)

[Formula 5]



(6)

(in the formulae (5) and (6), each of $Ar^1$ and $Ar^2$ is an aromatic ring having a carbon number of 6-20, which forms an imide ring of 5 or 6 atoms with an imide group adjoining thereto. In the aromatic ring, a part of carbon atoms may be substituted with S, N, O, $SO_2$ or CO, or a part of hydrogen atoms may be substituted with an aliphatic group, a halogen atom or a perfluoro aliphatic group. $Ar^1$ and $Ar^2$ may be same or different.) and heating in the presence of an organic acid at a temperature of at least 40°C to obtain a polyimide resin.

9. A method of producing a polyimide resin according to claim 8, which further comprises a modification step of heating the polyimide resin to at least 150°C to improve the physical properties of the polyimide resin after the polymerization step.

10. A method of producing a polyimide resin according to claim 8 or 9, wherein the mixing amounts of the diamino compound and the α, ω-alkylene diamine are not more than 95/5 but not less than 30/70 as a molar ratio.

11. A method of producing a polyimide resin according to any one of claims 8 to 10, wherein the α, ω-alkylene diamine is an aliphatic diamine having an alkylene group with a carbon number of 1-20.

12. A method of producing a polyimide resin according to any one of claims 8 to 11, wherein the diamino compound of the general formula (4) is at least one of 4,4'-diamino-2,2'-

bis(sulfoalkoxy)biphenyl and 4,4'-diamino-3,3'-bis(sulfoalkoxy)biphenyl.

13. A method of producing a polyimide resin according to any one of claims 8 to 12, wherein the tertiary amine is triethylamine.

14. A method of producing a polyimide resin according to any one of claims 8 to 13, wherein the organic solvent is m-cresol.

15. A method of producing a polyimide resin according to any one of claims 8 to 14, wherein the aromatic tetracarboxylic acid di-anhydride compound is naphthalene-1,8:4,5-tetracarboxylic acid di-anhydride.

16. An electrolyte membrane characterized by including a poluyimide resin as claimed in any one of claims 1 to 7.

17. A catalyst layer characterized by including a polyimide resin as claimed in any one of claims 1 to 7 and a given catalyst.

18. A membrane/electrode assembly characterized by joining an electrolyte membrane as claimed in claim 16 to a catalyst layer as claimed in claim 17.

19. A fuel cell characterized by including a membrane/electrode assembly as claimed in claim 18.

20. An electrolytic sensor characterized by including a membrane/electrode assembly as claimed in claim 18.

21. An electrochemical sensor characterized by including a membrane/electrode assembly as claimed in claim 18.